

**It is claimed:**

1. An apparatus for inflicting brain injury in a controlled manner by dropping a weight under the force of gravity onto the exposed brain surface of an animal from a height previously determined to be appropriate to generate the desired brain injury for the animal species, said apparatus comprising a barrel defining a delivery channel extending in a vertical direction and having a terminating end for positioning adjacent the exposed brain surface of an animal and a drop weight disposed within said delivery channel.  
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2. An apparatus according to claim 1, further comprising: a weight restraining means for temporarily supporting said weight at a desired distance above the exposed brain surface until the user selectively removes said weight restraining means to allow the weight to fall the desired distance under the force of gravity.  
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3. An apparatus according to claim 2 wherein said weight retaining means includes a pin extending horizontally through diametrically opposed holes defined in said barrel.  
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4. An apparatus according to claim 3 wherein said barrel defines more than one set of diametrically opposed holes for supporting said pin therethrough, said sets being vertically spaced along said barrel.
- 25 5. An apparatus according to claim 1, wherein said barrel is open at both ends.
6. The apparatus of claim 1, wherein said distance is selected to induce concussion, contusion or secondary brain damage.  
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7. A kit for inflicting brain injury in a controlled manner by dropping a weight under the force of gravity onto the exposed brain surface of an animal from

a height previously determined to be appropriate to generate the desired brain injury for the animal species and for time-related evaluation of chemical agents on memory or memory-related events, said kit comprising:

- a) a drop weight apparatus having a barrel defining a delivery channel
- 5 extending in a vertical direction and having a terminating end for positioning adjacent the exposed brain surface of an animal and a drop weight disposed within said delivery channel; and
- b) a maze having a first open space connected to a second open space, said second open space being in communication with at least four paths with food at
- 10 the end of one path, said maze allowing free horizontal movement of the animal between the open spaces and the four paths.

8. A method of inducing brain injury in a controlled manner comprising the steps of:

- 15 a) removing a portion of the skull of an animal to expose a portion of its brain with its dura mater intact;
- b) providing a barrel defining a delivery channel terminating adjacent the exposed brain surface of the animal and positioning said delivery channel to extend vertically ;
- c) providing a drop weight within said delivery channel;
- d) positioning said drop weight at a selected height above the exposed brain surface, said height being chosen based upon the species of the animal and upon the degree of brain damage to be inflicted;
- e) dropping said weight under the force of gravity to impact the exposed
- 25 brain surface.

9. The method of claim 16 wherein said weight is a cylindrical rod having a mass of 5 grams and a surface area at its impact end of about  $19.63 \text{ mm}^2$  and wherein said weight is dropped a distance of between 5 and 25 centimeters to generate brain injury in a rat.

10. The method of claim 17 wherein said weight is dropped a distance of 10

cm to generated secondary brain damage in a rat.

11. The method of claim 18 wherein said weight is a cylindrical rod having a mass of 12 grams and a surface area at its impact end of about 19.63 mm<sup>2</sup> and  
5 wherein said weight is dropped a distance of between 5 and 25 centimeters to generate brain injury in a cat or dog.

12. The apparatus of claim 11 wherein said weight is dropped a distance of 20 cm to generated secondary brain damage in a cat or dog.

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13. The method of claim 8 wherein said weight is a cylindrical rod having a mass of 15 grams and a surface area at its impact end of about 19.63 mm<sup>2</sup> and wherein said weight is dropped a distance of between 5 and 25 centimeters to generate brain injury in a cat or dog.

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14. A method for inflicting brain injury in an experimental animal in a controlled manner and for time-related evaluation of chemical agents on memory or memory-related events, said method comprising the steps of:

a) providing a drop weight apparatus having a barrel defining a delivery channel extending in a vertical direction and having a terminating end for positioning adjacent the exposed brain surface of an animal and a drop weight disposed within said delivery channel; and

b) providing a maze whereby experimental animals are allowed to move freely in horizontal directions with visible planar views within a certain open space that connects to another open space with channels of at least four paths where animal feed as a reward is placed at the end of a path; and

c) prior to inflicting brain injury, training experimental animal to remember the path that leads to a reward within the shortest time-interval;

d) administering drug;

30 e) inflicting brain injury by:  
i) removing a portion of the skull of an animal to expose a portion of its brain with its dura mater intact;

ii) positioning said delivery channel to extend vertically and to terminate adjacent the animal's exposed brain surface;

iii) positioning said drop weight at a selected height above the exposed brain surface, said height being chosen based upon the species of the animal and upon the degree of brain damage to be inflicted;

iv) dropping said weight under the force of gravity to impact the exposed brain surface;

f) monitoring time-related impact-induced cerebral injuries by timing the animals performance in the maze.

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15. A method for inflicting brain injury in an experimental animal in a controlled manner and for time-related evaluation of chemical agents on memory or memory-related events, said method comprising the steps of:

a) providing a drop weight apparatus having a barrel defining a delivery

15 channel extending in a vertical direction and having a terminating end for positioning adjacent the exposed brain surface of an animal and a drop weight disposed within said delivery channel; and

b) administering drug;

c) inflicting brain injury by:

20 i) removing a portion of the skull of an animal to expose a portion of its brain with its dura mater intact;

ii) positioning said delivery channel to extend vertically and to terminate adjacent the animal's exposed brain surface;

25 iii) positioning said drop weight at a selected height above the exposed brain surface, said height being chosen based upon the species of the animal and upon the degree of brain damage to be inflicted;

iv) dropping said weight under the force of gravity to impact the exposed brain surface;

d) monitoring time-related post-impact cerebral injuries by MRI diagnosis to

30 evaluate drug effects of test-compounds on said brain injuries.